

7189-A
PENTODE
FOR AF POWER AMPLIFIER APPLICATIONS

DESCRIPTION AND RATING

The 7189-A is a power-amplifier pentode designed for use in the audio-frequency power output stage of television and radio receivers and high-fidelity amplifiers.

The 7189-A is unilaterally interchangeable, both electrically and mechanically, with the 7189. It differs from the 7189 in having a higher screen-voltage rating and in specifying the internal connections to pins 1 and 6.

GENERAL

ELECTRICAL

Cathode - Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC*	6.3±0.6	Volts
Heater Current‡	0.76	Amperes

Direct Interelectrode Capacitances§

Grid-Number 1 to Plate: (g1 to p)	0.5	pf
Input: g1 to (h + k + g2 + g3)	10.8	pf
Output: p to (h + k + g2 + g3)	6.5	pf

MECHANICAL

Operating Position - Any
Envelope - T-6 1/2, Glass
Base - E9-1, Small Button 9-Pin
Outline Drawing - EIA 6-4

Maximum Diameter	0.875	Inches
Maximum Over-all Length	3.063	Inches
Maximum Seated Height	2.813	Inches

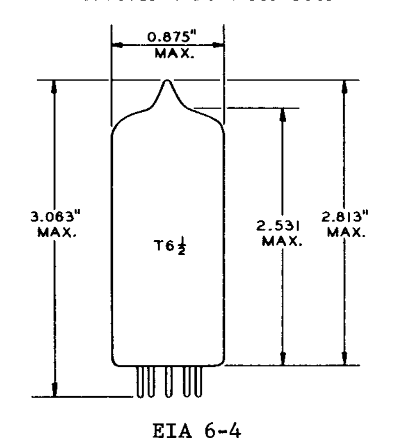
MAXIMUM RATINGS

Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making allowance for the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration.

The equipment manufacturer should design so that initially and throughout life no design-maximum value for the intended service is exceeded with a bogey tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all other electron devices in the equipment.

PHYSICAL DIMENSIONS

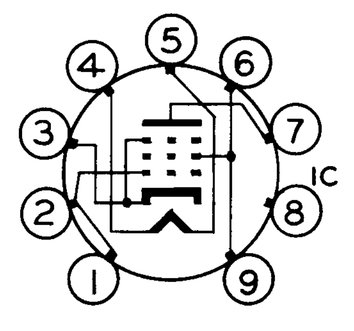


EIA 6-4

TERMINAL CONNECTIONS

Pin 1 - Grid Number 1
Pin 2 - Grid Number 1
Pin 3 - Cathode and Grid Number 3 (Suppressor)
Pin 4 - Heater
Pin 5 - Heater
Pin 6 - Grid Number 2 (Screen)
Pin 7 - Plate
Pin 8 - Internal Connection-Do Not Use
Pin 9 - Grid Number 2 (Screen)

BASING DIAGRAM



EIA 9LE

MAXIMUM RATINGS (Cont'd)

DESIGN-MAXIMUM VALUES

Parameter	Value	Unit
Plate Voltage	440	Volts
Screen Voltage	400¶	Volts
Plate Dissipation	13.2	Watts
Screen Dissipation	2.2#	Watts
DC Cathode Current	72	Milliamperes
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode	100	Volts
Heater Negative with Respect to Cathode	100	Volts
Grid-Number 1 Circuit Resistance		
With Fixed Bias	0.3	Megohms
With Cathode Bias	1.0	Megohms

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS

Parameter	Value	Unit
Plate Voltage	250	Volts
Screen Voltage	250	Volts
Grid-Number 1 Voltage	-7.3	Volts
Plate Resistance, approximate	40000	Ohms
Transconductance	11300	Micromhos
Plate Current	48	Milliamperes
Screen Current	5.5	Milliamperes
Amplification Factor (Grid-Number 1 to Grid-Number 2)	19.5	

CLASS A_1 AMPLIFIER

Parameter					Unit
Plate Voltage	250	250	250	250	Volts
Screen Voltage	250	250	250	210	Volts
Grid-Number 1 Voltage	-7.3	-7.3	-8.4	-6.4	Volts
Peak AF Grid-Number 1 Voltage	6.1	6.2	4.95	4.8	Volts
Zero-Signal Plate Current	48	48	36	36	Milliamperes
Maximum-Signal Plate Current	49.5	50.6	36.8	36.6	Milliamperes
Zero-Signal Screen Current	5.5	5.5	4.1	3.9	Milliamperes
Maximum-Signal Screen Current	10.8	10	8.5	7.3	Milliamperes
Load Resistance	5200	4500	7000	7000	Ohms
Total Harmonic Distortion, approximate	10	10	10	10	Percent
Maximum-Signal Power Output	5.7	5.7	4.2	4.3	Watts

PUSH-PULL CLASS AB_1 AMPLIFIER, VALUES FOR TWO TUBES

Parameter				Unit
Plate Voltage	250	300	400	Volts
Screen Voltage	250	300	300	Volts
Cathode-Bias Resistor	130	130	---	Ohms
Grid-Number 1 Voltage	---	---	-15	Volts
Peak AF Grid-to-Grid Voltage	22.6	28.2	30	Volts
Zero-Signal Plate Current	62	72	15	Milliamperes
Maximum-Signal Plate Current	75	92	105	Milliamperes
Zero-Signal Screen Current	7.0	8.0	1.6	Milliamperes
Maximum-Signal Screen Current	15	22	25	Milliamperes
Effective Load Resistance, Plate-to-Plate	8000	8000	8000	Ohms
Total Harmonic Distortion	3	4	4	Percent
Maximum-Signal Power Output	11	17	24	Watts

PUSH-PULL CLASS B AMPLIFIER, VALUES FOR TWO TUBES

Parameter			Unit
Plate Voltage	250	300	Volts
Screen Voltage	250	300	Volts
Grid-Number 1 Voltage	-11.6	-14.7	Volts
Peak AF Grid-to-Grid Voltage	22.6	28.2	Volts
Zero-Signal Plate Current	20	15	Milliamperes
Maximum-Signal Plate Current	75	92	Milliamperes
Zero-Signal Screen Current	2.2	1.6	Milliamperes
Maximum-Signal Screen Current	15	22	Milliamperes
Effective Load Resistance, Plate-to-Plate	8000	8000	Ohms
Total Harmonic Distortion	3	4	Percent
Maximum-Signal Power Output	11	17	Watts

CHARACTERISTICS AND TYPICAL OPERATION (Cont'd)

CLASS A_1 AMPLIFIER, TRIODE CONNECTION△

Plate Voltage	250	Volts
Cathode-Bias Resistor	270	Ohms
Peak AF Grid-Number 1 Voltage	9.5	Volts
Zero-Signal Plate Current	34	Milliamperes
Maximum-Signal Plate Current	36	Milliamperes
Load Resistance	3500	Ohms
Total Harmonic Distortion, approximate	9	Percent
Maximum-Signal Power Output	1.95	Watts

PUSH-PULL CLASS AB_1 AMPLIFIER, TRIODE CONNECTION, VALUES FOR TWO TUBES△

Plate Voltage	250	300	Volts
Cathode-Bias Resistor	270	270	Ohms
Peak AF Grid-to-Grid Voltage	23.4	28.2	Volts
Zero-Signal Plate Current	40	48	Milliamperes
Maximum-Signal Plate Current	43.4	52	Milliamperes
Effective Load Resistance, Plate-to-Plate	10000	10000	Ohms
Total Harmonic Distortion	2.5	2.5	Percent
Maximum-Signal Power Output	3.4	5.2	Watts

NOTES

* The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.

‡ Heater current of a bogey tube at Ef = 6.3 volts.

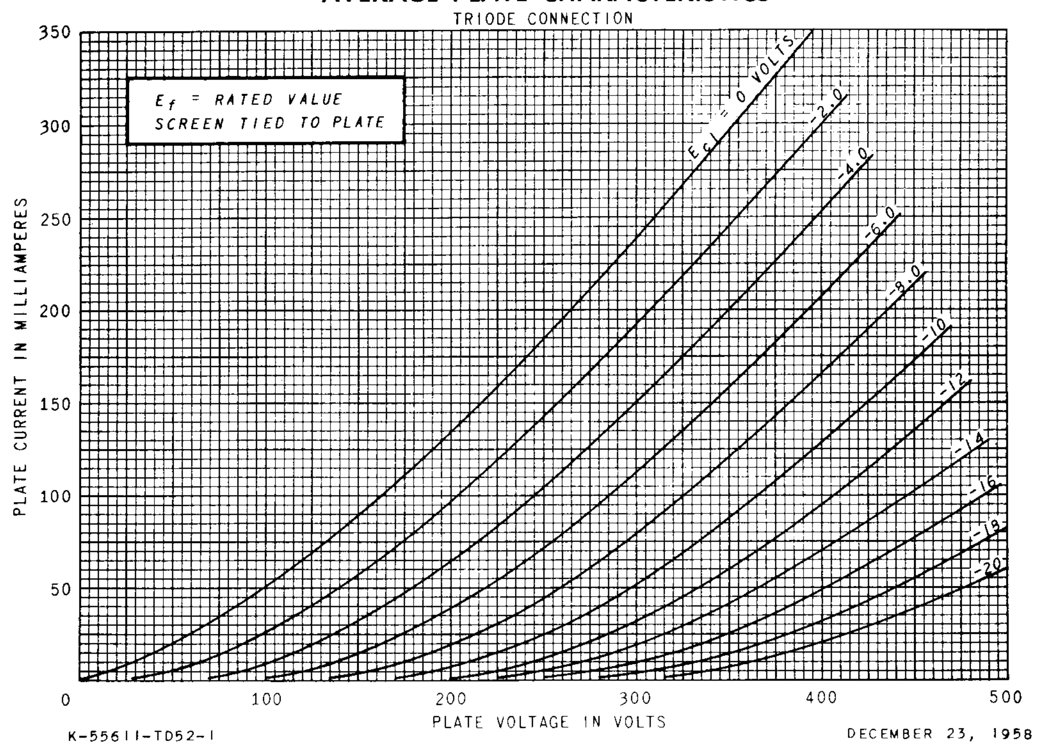
§ Without external shield.

¶ The Design-Maximum screen voltage rating is 415 volts in push-pull circuits where the screen of each tube is connected to a tap on the plate winding of the output transformer.

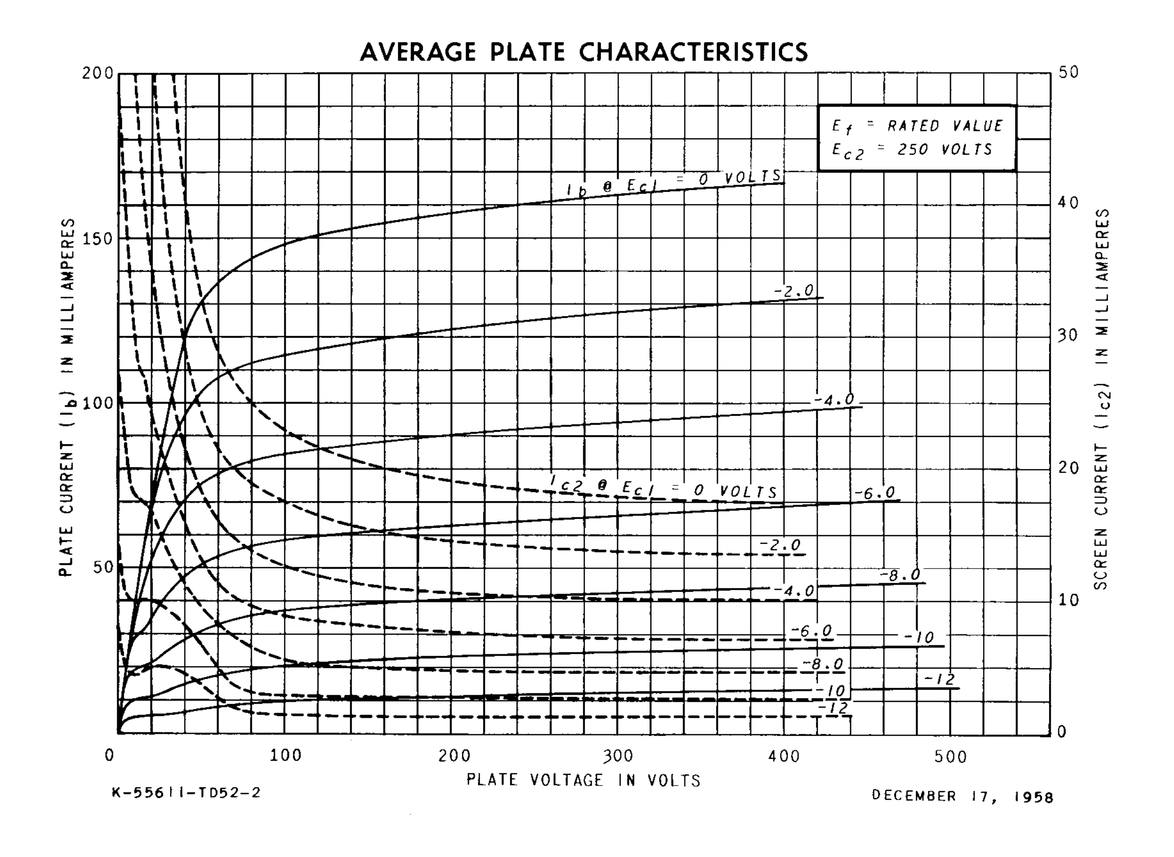
Screen dissipation may reach 4.4 watts during periods of maximum input of speech and music signals, under worst probable operating conditions as specified for the Design-Maximum rating system.

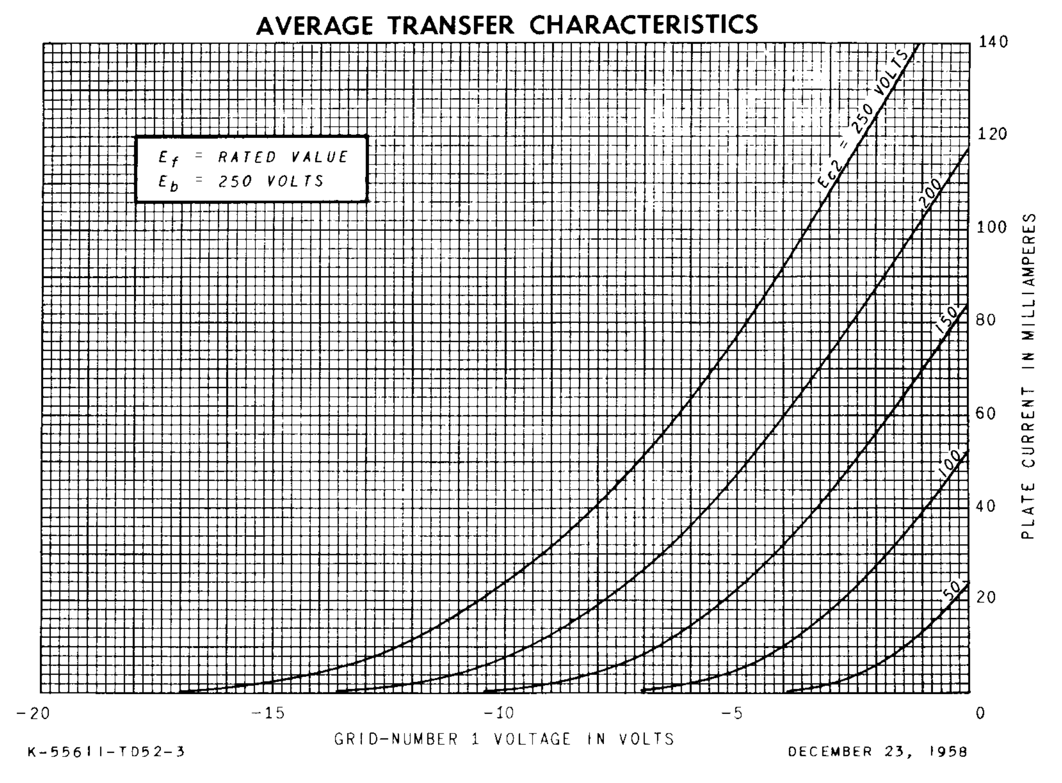
△ With screen tied to plate.

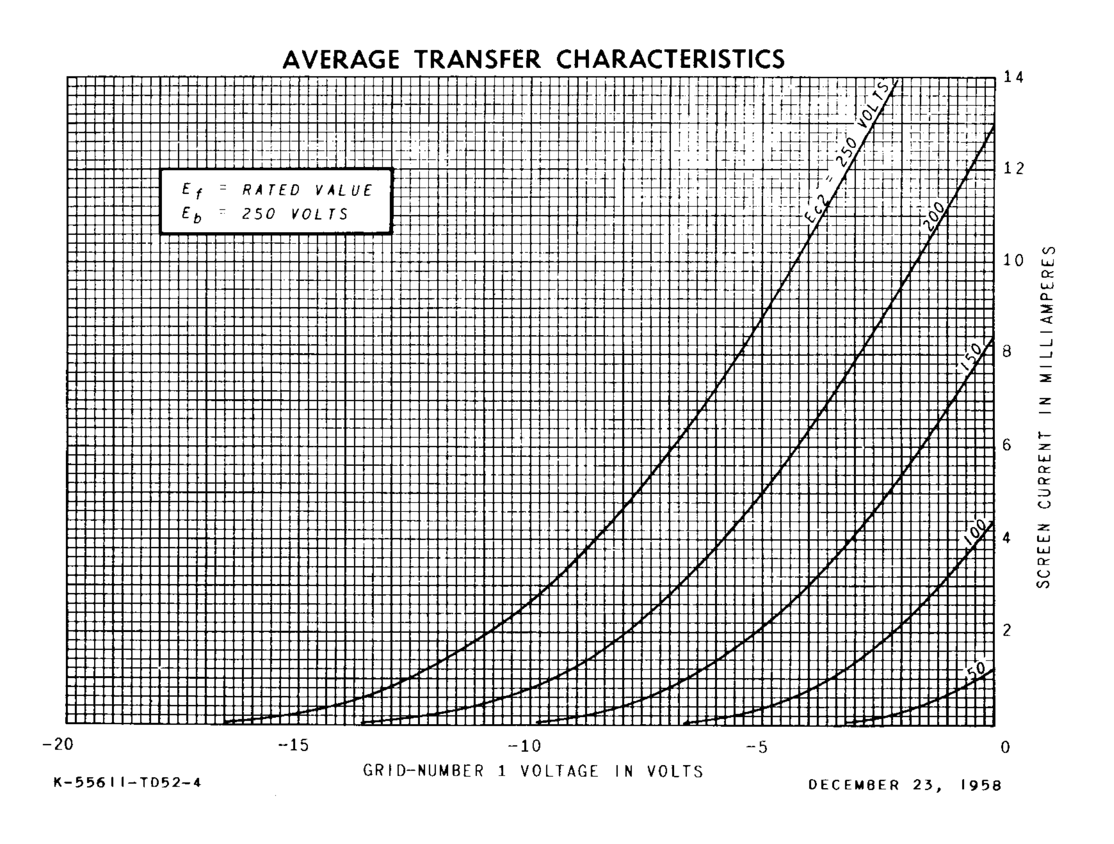
AVERAGE PLATE CHARACTERISTICS



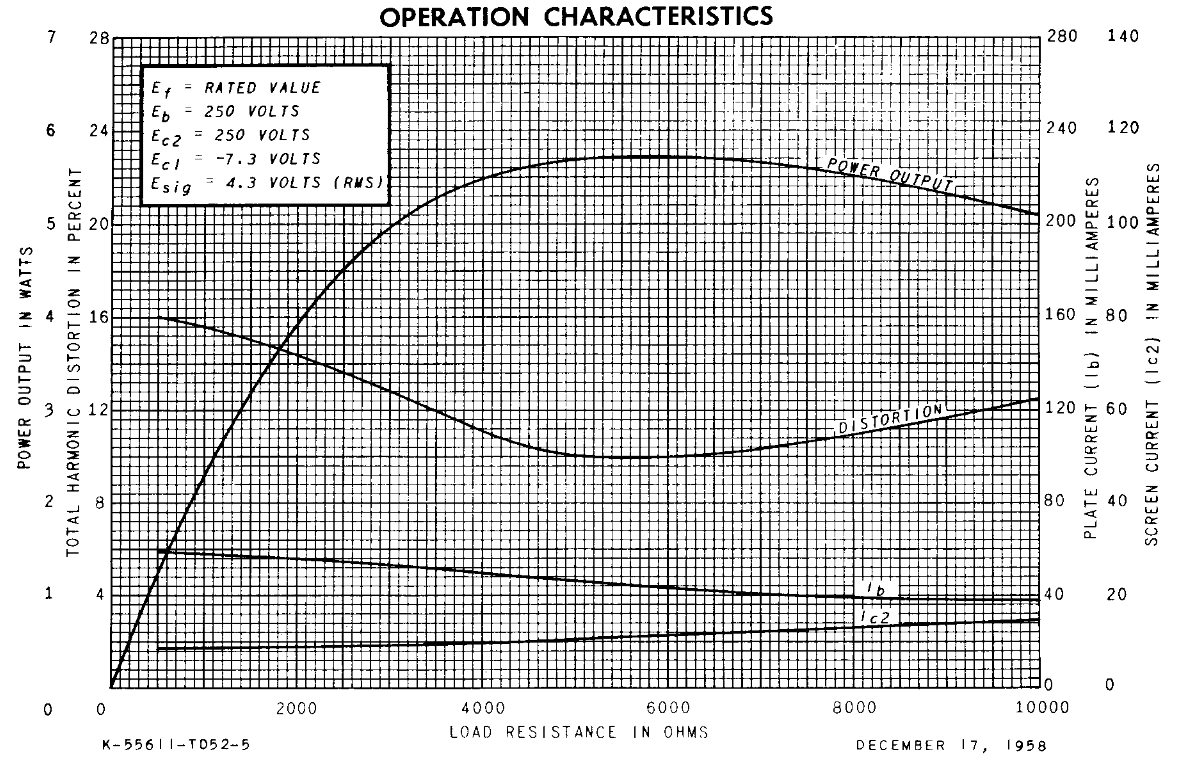
AVERAGE PLATE CHARACTERISTICS




AVERAGE TRANSFER CHARACTERISTICS
Ef = RATED VALUE
Eb = 250 VOLTS
Ec2 = 250 VOLTS
200
150
100
50
140
120
100
80
60
40
20
0
PLATE CURRENT IN MILLIAMPERES
-20
-15
-10
-5
GRID-NUMBER 1 VOLTAGE IN VOLTS
K-55611-TD52-3
DECEMBER 23, 1958


AVERAGE TRANSFER CHARACTERISTICS
Ef = RATED VALUE
Eb = 250 VOLTS
Ec2 = 250 VOLTS
200
150
100
50
14
12
10
8
6
4
2
0
SCREEN CURRENT IN MILLIAMPERES
-20
-15
-10
-5
GRID-NUMBER 1 VOLTAGE IN VOLTS
K-55611-TD52-4
DECEMBER 23, 1958

OPERATION CHARACTERISTICS



OPERATION CHARACTERISTICS

E_f = RATED VALUE
E_b = 250 VOLTS
E_{c2} = 250 VOLTS
E_{c1} = -7.3 VOLTS
R_L = 5200 OHMS

POWER OUTPUT
DISTORTION
I_b
I_{c2}

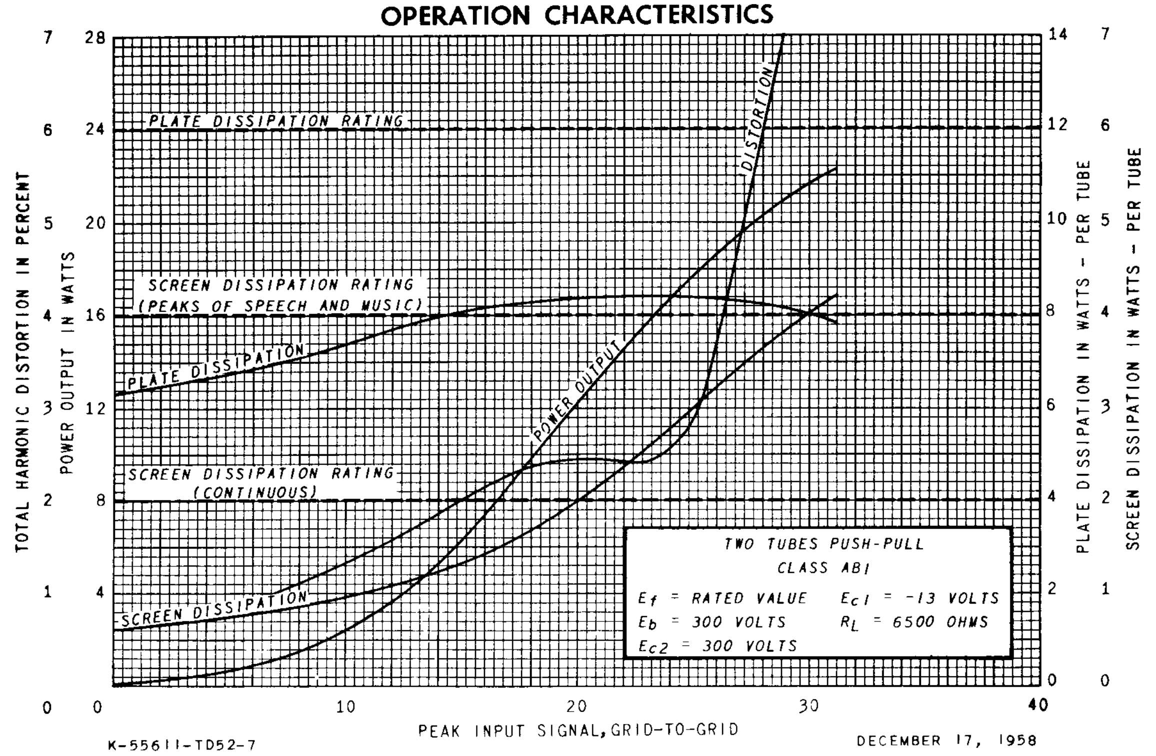
POWER OUTPUT IN WATTS: 0, 1, 2, 3, 4, 5, 6, 7
TOTAL HARMONIC DISTORTION IN PERCENT: 0, 4, 8, 12, 16, 20, 24, 28
PLATE CURRENT (I_b) IN MILLIAMPERES: 0, 10, 20, 30, 40, 50, 60, 70
SCREEN CURRENT (I_{c2}) IN MILLIAMPERES: 0, 5, 10, 15, 20, 25, 30, 35

INPUT SIGNAL IN VOLTS (RMS): 0, 1, 2, 3, 4, 5

K-55611-TD52-6

DECEMBER 17, 1958

OPERATION CHARACTERISTICS



OPERATION CHARACTERISTICS

PLATE DISSIPATION RATING
SCREEN DISSIPATION RATING (PEAKS OF SPEECH AND MUSIC)
PLATE DISSIPATION
SCREEN DISSIPATION RATING (CONTINUOUS)
SCREEN DISSIPATION
POWER OUTPUT
DISTORTION
TWO TUBES PUSH-PULL
CLASS AB1
E_f = RATED VALUE
E_{c1} = -13.5 VOLTS
E_b = 400 VOLTS
R_L = 10000 OHMS
E_{c2} = 300 VOLTS
TOTAL HARMONIC DISTORTION IN PERCENT
POWER OUTPUT IN WATTS
PLATE DISSIPATION IN WATTS - PER TUBE
SCREEN DISSIPATION IN WATTS - PER TUBE
PEAK INPUT SIGNAL GRID-TO-GRID
K-55611-TD64-1
APRIL 10, 1959